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DEVELOPMENTS IN 1965 FOR MECHANICAL HARVESTING
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Governor Romney's Commission on Migrant Labor, reported in April of this year that Michigan grown crops requiring seasonal labor are valued in excess of \$175,000,000. The supply of Mexican Nationals has been cut off, and the stream of migrant laborers which once flowed through Michigan is drying up. Many growers are finding it difficult, or impossible, to recruit the seasonal help they need.

The only feasible solution to the seasonal labor problem appears to lie in the direction of increased mechanization. Although I have talked before to members of your Society about mechanical harvesting and bulk handling, interest in labor saving devices continues, and your program committee has asked for another progress report.

MACHINE HARVESTING APPLES FOR PROCESSING

Although the results are inconclusive, Michigan apple growers are interested in what we are doing in the field of machine harvesting and we want you to know something of the progress that is being made.

The results of the work done during the past four seasons show that apples can be quickly and easily separated from the tree by means of the mechanical shakers now available. The labor cost of mechanical harvesting is less than that of hand picking. Although machine picking causes more bruising than hand picking, machine-picked fruit is acceptable for immediate processing or within a few days after harvesting. The quality of the products made from machine-picked apples is essentially equal to that of hand-picked fruit.

This sounds encouraging, and it may lead growers who produce for processing outlets, to believe that they are justified in assuming that machine harvesting has arrived. There are, however, some entries on the debit side of the ledger which growers should consider before deciding to convert to machines.

For one thing, better fruit collecting equipment, specifically designed for apples, must be developed before mechanization can be recommended.

The modified cherry collecting units used in our experiments cannot be employed to advantage in harvesting apples. We have some ideas, and I am glad to say that we are hard at work on this phase of the problem.

Our work shows that machines are most effective in harvesting trees of medium size. Trees of large size may require special equipment which would tend to increase costs. It was found that the shape of the tree is also an important factor. Some trees tend to grow quite upright, while others have lateral branches which originate near the ground. When the weight of the crop pulled lateral branches down near or onto the ground, the fruit borne by these limbs had to be picked before the fruit collecting units could be moved in under them. This probably means that low-hanging branches will have to be cut off or picked by hand. The trials also showed that the results are more likely to prove satisfactory when mechanized picking is confined to bruise-resistant varieties.

The results of the work done so far can be summarized by saying that while mechanized picking is feasible under favorable conditions, we do need specially designed equipment, and for the present at least growers should confine their efforts to bruise-resistant varieties which can be processed within a relatively short time. The chances of success will be enhanced if machines are used on upright growing trees of medium size.

FIELD-GRADING APPLES BEFORE STORAGE

In a normal year Michigan apple growers store about 8,000,000 bushels of orchard run fruit. At least 15 percent of these apples are of inferior quality. This means that more than 1,000,000 bushels of undergrade apples are held for periods of several months in refrigerated or CA storage, and then sorted out and sold to processors at prices which, in many instances, do not pay storage and handling costs. A practical method of eliminating the undergrade stock before storage would, in effect, increase the capacity of Michigan's storages for good apples, and reduce the per unit cost of storing and handling the better grades.

In an effort to solve this problem, a small in-the-orchard grader has been used experimentally during the past two seasons. Although the results are somewhat inconclusive, we decided to present a brief progress report on this piece of equipment.

The mobile orchard grader used in the trials consisted of a receiving belt, two short eliminator sections, sorting rolls and a bulk box filler.

The grader was "spotted" between two rows of unharvested trees. When a picker's bucket was full he walked to the machine and laid it on the receiving belt. The canvas chute was opened and the fruit allowed to roll out. The "checker" inspected the apples and handed the picker a ticket which was later redeemed for money at the prevailing piece-work rate.

On the average, almost 20 percent of the orchard run fruit was eliminated during the field grading operation. Although using the machine caused some bruising, it proved to be relatively minor. This year's experimental lots are still in storage, but the results achieved in 1964 indicate that the bruising incident to orchard grading did not materially reduce net returns.

The labor cost of field grading was just under 10 cents per bushel. The savings in storage and handling, brought about by eliminating the under-

grade apples before storage, were more than enough to pay the labor cost of doing the work.

While the figures look good, field grading has some very real disadvantages. For one thing, using the orchard grader increased the difficulty of keeping piece-work records. When the checker walked away for a few minutes, to adjust the grader or obtain more tickets, pickers had to wait. Generally speaking, pickers did not like to "work to the machine." They said that they had to walk farther than was the case when they emptied their buckets directly into bulk boxes, and that the grader tended to slow them down. Breakdowns, moves and/or slow pickers decreased the efficiency of the entire operation. A grower who "orchard-sorted" all of his apples might have to provide a unit for each four to six members of his crew, and the expense would probably be hard to justify.

While there is much to be said for orchard sorting, it now appears that additional work will have to be done before the practice can be recommended.

HANDLING SWEET CHERRIES IN BULK BOXES

Until quite recently, bulk handling of fruit has been confined, for the most part, to apples, pears, clingstone peaches, plums and tart cherries. The advantages of bulk handling are, however, so obvious and so significant that persistent efforts are being made to develop methods and equipment which will make it feasible to handle other fruits in bulk.

Preliminary studies of the possibility of handling Michigan grown sweet cherries in bulk were conducted during the 1962 season. These trials led to the conclusion that sweet cherries could be handled successfully in bulk boxes if they were not piled too deep. The figures showed that the practice would reduce handling costs without lowering grades.

During the past summer, Cherry Growers, Inc., of Traverse City, handled more than 2,000,000 pounds of "brining" sweets in bulk boxes. In some cases the containers, lined with pliofilm, were orchard-filled to a depth of about 14 inches and then trucked to the processing plant where more cherries and brine enough to cover the fruit were added. After a wooden cover had been fastened in place, the boxes were stacked and allowed to stand until the fruit was ready for finishing, grading and packing. During the holding period the containers were checked frequently to make sure that the brine was at the proper level and of sufficient concentration. Some bulk boxes were filled and brined at receiving stations with cherries delivered in lugs. The filled containers were then moved to the processing plant for storage. In other instances growers were supplied with bulk boxes that had been partially filled with brine—enough to cushion the fruit during transit. After being filled with cherries these boxes were moved to the processing plant where more brine was added. The particular method employed depended on circumstances.

The cherries in several hundred of the bulk boxes have been packed out. Cherry Growers, Inc., are finding that, compared to tank-brined cherries, the fruit can be handled more easily and that the percentage of top-grade cherries runs higher. In some cases the brined cherries are being shipped in bulk boxes rather than in the barrels formerly used. To make a long story short, bulk box handling saves time and money for the grower, and reduces handling costs at the processing plant.

The success of this operation probably means that more and more

Michigan grown sweets will be handled in bulk. Cherry growers should be alert to this trend and be prepared to handle their fruit in bulk boxes.

PACKING SWEET CHERRIES FOR THE FRESH FRUIT MARKET

In 1964 the western states grew and sold more than 50,000,000 pounds of sweet cherries on the fresh fruit market. During this year Michigan growers packed and sold approximately half a million pounds of sweet cherries on the same market. This means that in a normal year our western competitors merchandize 100 times as many fresh sweets as we do.

Let me be more specific. In 1964, total carlot unloads of sweet cherries in Chicago (a market which is in our own backyard) were 234; only 15 of these cars, or a little more than 6 percent came from Michigan. The other 94 percent of the cherries came from states that were much farther away.

More than half of the sweet cherry trees growing in Michigan are less than 10 years old, and it is estimated that during the next five years production will increase by at least 50 percent. What are we going to do with this fruit? One possibility is to tap the mid-west fresh fruit markets that are now being dominated by growers who live 2,000 miles away.

In addition to those who sell at roadside markets and in local stores we have, in Michigan, a few enterprising growers who are packing sweets for the fresh fruit market on a commercial scale. During the past summer I had the pleasure of visiting:

Per-Clin (Smeltzer) Orchards at Arcadia
Gray's Fruit Farm at Traverse City
Vernon Bull Orchard at Casnovia
"Northwood" at Shelby

There may be other Michigan sweet cherry growers who pack for the fresh fruit market, but if so I did not learn of their operations.

I talked at some length with all of the packers mentioned and have summarized my conclusions as follows:

Sweets that are to be sold in the fresh fruit market must be picked with stems. This means that the grower must provide picker training and close supervision. Size and quality are the keys to success. The cherries should be at least $\frac{3}{4}$ -inch in diameter and of top grade. Schmidts are usually considered the best variety. Windsors are also popular if they are large, fully matured and free from cracks. Hardy Giants are acceptable and Hedelfingens are often used, although the flavor is not considered as desirable as that of Schmidts. The packer who would succeed must provide himself with the necessary equipment—a receiving belt, a sorting belt, conveyor, box filler and scales are essential. Cluster breakers, a sizer and lift equipment are desirable. Refrigerated storage space in which the cherries can be held before and after grading must be available. Apple storage houses, with which Michigan is well provided, can often be used to advantage.

All of Michigan's sweet cherry packers who operated in 1965 had developed markets for their fruit. Growers who would like to divert some of their best quality sweet cherries to this market, but are not in a position to do their own packing, should contact a producer who is already

established in this field. Those who would prefer to pack for themselves, but do not have selling experience, may wish to investigate the possibility of merchandising the fruit through apple salesmen, most of whom have contacts which should enable them to sell sweet cherries as well as apples.

Meeting the conditions outlined should enable growers, or organizations of growers, to sell a substantial volume of sweet cherries on fresh fruit markets. The premium usually paid by fresh fruit buyers should enable packers, who supply a quality product, to realize substantial profits on the operation.

TART CHERRY HARVESTING AND HANDLING

Our cherry harvesting trials were begun in 1956. In that year we machine-picked (if you could call it that) about 500 pounds of fruit. Although at first progress was slow, it was steady. The necessary equipment was developed and during the last two or three years more than 100 Michigan cherry growers have provided themselves with harvesting machines. During the season just past, these producers used their equipment in harvesting approximately 20,000,000 pounds of cherries.

More than 100 other growers have already placed orders for cherry harvesting equipment that is to be made this winter and delivered next spring. This probably means that 40- to 50,000,000 pounds of cherries will be machine harvested in 1966. In other words, mechanized picking has come to stay.

Cherries harvested with machines usually contain more leaves and twigs than hand harvested fruit. This means, that the cherries are often more difficult to sort and process. It is also true that if the temperature of water-handled cherries is allowed to go above 60° or if the fruit is subjected to rough handling after harvest, the percentage of scald is sure to increase. A solution to these and related problems will require the cooperation of all concerned. Equipment manufacturers are constantly improving the machines. Processors are helping by installing electric sorting equipment and developing improved in-the-plant handling techniques. Growers should not try to go too fast, they should provide good in-the-orchard supervision, keep fruit temperatures at a minimum, and handle the harvested fruit with care.

By working together, equipment manufacturers, growers and processors can harvest and pack cherries that meet the grade standards demanded by the trade. Doing so will help to create the demand which will enable the industry to merchandise the increased tonnages which are in prospect.